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FEASIBILITY OF LOCATING FEED MILLS IN MINDANAO

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FEASIBILITY OF LOCATING FEED MILLS IN MINDANAO[1]

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INTRODUCTION

Mindanao is one of the leading livestock producing areas in the Philippines and a major producer of feed grains. This is shown by the fact that 3 of the leading sources of hogs shipped to Manila in 1966-67 were located in Mindanao as was 1 of the leading sources of carabaos and 2 of the leading sources of cattle.

The 1960 census reported that 6 of the 10 leading corn producing provinces were in Mindanao. Yet, only 3 of 39 reported feed mills in the country (in 1971) were located in Mindanao and they were not large mills. Feed mills in the Manila area and in Cebu get their supply of white corn mostly from Bukidnon, Cotabato and Davao in Mindanao, and Iloilo, Cebu and Negros in the Visayas.

Corn is considered to be one of the best major ingredients for poultry and livestock feed. But in the Philippines humans compete with poultry and livestock in corn consumption. And there are recurrent shortages that could be partly due to high marketing costs and to the lack of production incentives.

Most feed millers buy corn from middlemen and this may contribute to increased corn marketing costs. For example, in 1971 the prices that feed mills paid for corn in Manila exceeded the prices they paid in Mindanao by 11¢ to 37¢ per kilo which is equal to ₱6.27 to ₱21.09 per cavan (57 kilos). If feed mills are located in Mindanao, they can buy corn directly from the farmers and should be able to pay more favorable prices (to farmers) and thus encourage corn production.

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It was shown by a livestock marketing study[2] that there are substantial savings (33 to 54 percent) in marketing costs by shipping meat to Manila instead of live animals. Another study,[3] made to determine the optimal locations and sizes of livestock processing plants in the Philippines, placed 3 of 9 recommended locations in Mindanao, namely Cagayan de Oro, Davao and General Santos. A number of businessmen are interested in constructing the proposed processing plants and efforts are being made to change the meat inspection laws - to a national system - so that livestock processing plants may be located in livestock producing areas. This means that the processing plants' by-products, such as blood meal, bone meal and meat scraps, may be used effectively in animal feeds.

With the establishment of meat processing plants in livestock production areas, the marketing channels for livestock will be substantially improved. Processing plants should be able to buy directly from livestock producers and marketing costs will be reduced, thus narrowing the gap between the prices of producers and consumers. This should create production incentives for livestock and should certainly increase the demand for feed.

OBJECTIVES

The objectives of this study were to:

1. Determine the annual requirement for mixed animal feed in selected Mindanao areas and the sources and costs of such feed to livestock producers, and
2. Determine the feasibility of constructing feed milling plants to serve livestock producers' needs in various areas of Mindanao.

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[2] Alunan, J. A. and L. B. Darrah, "Some Legal and Economic Aspects of Livestock Marketing," Department of Agricultural Economics, U. P. College of Agriculture, Staff Paper Series 103, October 1970.

[3] Collado, G. M., J. A. Alunan and L. B. Darrah, "Optimal Locations and Sizes of Livestock Processing Plants," Department of Agricultural Economics, U.P. College of Agriculture, Staff Paper Series 108, August 1971.

Best Available Document

PROCEDURE

Data on the shipments of mixed animal feed to Mindanao were obtained from the feed mills in Manila and Cebu that ship feed to that area.

The provinces in Mindanao were grouped according to proximity and the possible locations of feed mills were determined based on the volume of mixed animal feed entering the major port serving each provincial grouping and the size of the poultry and hog populations. The three provincial groupings were as follows: Group A: Bukidnon, Lanao del Norte, Lanao del Sur, Misamis Occidental, Misamis Oriental and Zamboanga del Norte; Group B: Davao del Norte, Davao del Sur and part of Cotabato del Norte; Group C: the balance of Cotabato del Norte, Cotabato del Sur and Zamboanga del Sur.

FEED SHIPMENTS

Volume and Costs

The volume of mixed feed, largely poultry feed, shipped to Mindanao in 1971 averaged 18,123 bags per month. About 43 percent of the total volume came from Cebu; the balance (57 percent) came from the Manila area. The major ports of entry were Cagayan de Oro, Davao and General Santos. These 3 ports accounted for 77 percent of the total volume of mixed feed shipped to Mindanao.

Transportation and handling cost ranged from ₱1.35 per bag for shipments from Cebu to General Santos up to ₱1.93 per bag for shipments from Manila to Davao (Table 1).

Potential Savings[4]

It may be assumed that, if feed mills are located in Mindanao, the transportation and handling cost of corn shipped from Mindanao to Cebu and Manila would be eliminated. Corn, as a major feed ingredient, can comprise about 45 percent of the total bulk of mixed feed. Thus, it is conservative to assume an additional saving of about 45 percent of the total transportation and handling cost of mixed feed for every bag of feed shipped to Mindanao.

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[4] It is recognized that some corn from the Cagayan Valley and other areas may be shipped, as mixed feed, to Mindanao. However, the total cost involved should not be greatly different and should more or less offset corn from Mindanao that goes, as mixed feed, to these other areas.

Combining these 2 savings, the potential savings will range from ₱1.96 to ₱2.80 per bag and, based on the 1971 volume of shipments, the total saving should approximate ₱541,000 (Table 1).

TABLE 1. MONTHLY SHIPMENT OF PREPARED FEED AND POTENTIAL SAVINGS RESULTING FROM NOT SHIPPING CORN TO CEBU AND MANILA AND BACK TO MINDANAO, 1971

Provincial group	Bags per month	Potential savings (Pesos)		
		Per bag	Per month	Per year
A	6,295	2.25	14,164	169,968
B	9,254	2.80	25,911	310,932
C	2,574	1.96	5,045	60,540
Total	18,123	-	45,120	541,441

LIVESTOCK POPULATION PROJECTIONS

The projected hog and poultry populations for the period 1970 through 1974 in selected Mindanao provinces, by provincial group, are presented in Tables 2 and 3, respectively.

Hogs

The Group A provinces had a 1970 hog population of 932 thousand head (Table 2). About half of this total was located in the 2 leading provinces of Misamis Oriental and Zambonaga del Norte. The hog population in this group of provinces has been projected to reach approximately 1.5 million head in 1974.

TABLE 2. PROJECTED HOG POPULATION, 1970-1974

Provincial group	Year				
	1970	1971	1972	1973	1974
			Thousand head		
A					
Bukidnon	113	127	142	159	178
Lanao del Norte	153	171	192	215	241
Lanao del Sur	14	16	18	20	23
Misamis Occidental	166	186	209	234	262
Misamis Oriental	296	332	371	416	466
Zamboanga del Norte	189	211	236	265	297
Sub-total*	932	1,043	1,169	1,310	1,466
B					
Cotabato del Norte (17%)	37	41	46	52	59
Davao del Norte	133	149	167	187	209
Davao del Sur	306	343	384	430	482
Sub-total*	476	533	597	668	750
C					
Cotabato del Norte (83%)	184	206	231	259	288
Cotabato del Sur	133	149	167	187	209
Zamboanga del Sur	356	398	447	500	560
Sub-total*	673	754	844	946	1,058
Grand total*	2,080	2,330	2,610	2,913	3,274

* Totals may not add due to rounding.
SOURCE: Bureau of Animal Industry.

Area B had 476 thousand hogs in 1970 with the bulk located in Davao del Sur. Projections for 1974 indicate this area will have approximately 750 thousand hogs.

Area C, with 673 thousand hogs in 1970, is projected to have just over 1 million hogs in 1974. More than half of these hogs are in or projected for Zamboanga del Sur.

Poultry

The Group A provinces had a total of nearly 8 million head of poultry in 1970 with Lanao del Sur and Lanao del Norte being the leaders and accounting for more than 40 percent of the total (Table 3). Projections to 1974 indicate a poultry population in the area of approximately 10 million birds.

In Area B, the 1970 poultry population was somewhat more than 4 million birds. Davao del Sur was by far the leading province. In 1974, this area is projected to have more than 5 million birds.

Area C, with a 1970 poultry population of just over 10 million birds, is projected to have nearly 13 million birds in 1974. Approximately half of the poultry is located in Cotabato del Norte.

TABLE 3. PROJECTED POULTRY POPULATION, 1970-1974

Provincial group	Year 1970	1971	1972	1973	1974
A			Thousand head		
Bukidnon	1,102	1,171	1,246	1,324	1,408
Lanao del Norte	1,425	1,515	1,612	1,713	1,821
Lanao del Sur	1,920	2,041	2,169	2,306	2,451
Misamis Occidental	1,121	1,192	1,267	1,247	1,432
Misamis Oriental	969	1,030	1,095	1,164	1,238
Zamboanga del Norte	1,368	1,455	1,546	1,644	1,747
Sub-total*	7,906	8,405	8,935	9,498	10,096
B					
Cotabato del Norte (7%)	381	405	430	458	486
Davao del Norte	978	1,061	1,128	1,199	1,274
Davao del Sur	2,803	2,980	3,168	3,367	3,579
Sub-total*	4,162	4,446	4,726	5,023	5,340
C					
Cotabato del Norte (93%)	4,903	5,212	5,540	5,889	6,260
Cotabato del Sur	2,309	2,455	2,609	2,774	2,948
Zamboanga del Sur	2,955	3,142	3,340	3,550	3,774
Sub-total*	10,167	10,808	11,499	12,213	12,982
Grand total*	22,236	23,658	25,160	26,734	28,418

*Totals may not add due to rounding.
SOURCE: Bureau of Animal Industry.

POTENTIAL FEED REQUIREMENT

It is not known how many animals (hogs and chickens) are fed mixed feed in Mindanao. It is known that the 1971 shipments of mixed feed to the area approximated 217,500 bags (40 kilos each). It is known that there are 3 small feed mills in the area and they do sell some mixed feed. Also, it is known that some large farmers have facilities for and do mix feed for their own use. But it is not known how the feed produced in the Mindanao mills or on the farms compares, quality-wise, with that shipped into the area from Cebu and Manila.

It is believed that, due to transport and handling cost, the price of feed shipped to Mindanao is higher than if the same quality of feed was produced in the area. It is likely that if a lower-priced, quality, mixed feed was available more farmers would use it and perhaps some would use more of it.

So how does one project the potentials for new feed mills?

Simply replacing the feed shipped into the area from northern sources would be one method. But in view of the saving in transport and handling cost, this would likely be too conservative to be realistic. It is highly probable that lower prices for quality feed would contribute to increased usage.

Therefore, potential requirements have been computed on 3 bases, namely:

1. Only 1 percent of the hogs and poultry will be fed mixed feed,

2. Only 2 percent of the hogs and poultry will be fed mixed feed, and

3. 4 percent of the hogs and poultry will be fed mixed feed.

If only 1 percent of the animals considered was fed mixed feed, the 1973 requirement would total 389 thousand bags, consisting of 267 thousand bags of hog feed and 122 thousand bags of poultry feed (Table 4). Combining 1971 inshipments and local production should yield a figure not far different than what this potential would have been in

1971. Therefore it is believed that this basis for projecting potentials for a high quality, lower-priced feed is too conservative to be realistic.

If 2 percent of the animals was fed with commercial mixed feed, the 1973 requirement would total 778 thousand bags, consisting of 534 thousand bags of hog feed and 244 thousand bags of poultry feed. It is believed that this volume represents a realistic short-run goal, given a lower-priced, high-quality, mixed feed.

If the 4 percent basis is used, the 1973 requirement would total 1,555 thousand bags of mixed feed consisting of 1,068 thousand bags of hog feed and 487 thousand bags of poultry feed. This, it is believed, probably represents too large a volume to be realistic short-run goal but over a longer period of time, it should be a realistic goal to attain.

TABLE 4. POTENTIAL FEED REQUIREMENTS*, 1973

Assumption and provincial group	Per day**			Per year		
	Hog	Poultry	Total	Hog	Poultry	Total
		Bags			Thousand bags	
1 percent assumption:						
A	383	138	521	119	43	162
B	196	72	268	61	23	84
C	278	177	455	87	56	143
Total	857	387	1,244	267	122	389
2 percent assumption:						
A	766	276	1,042	239	87	326
B	392	144	536	122	46	168
C	556	354	910	173	111	284
Total	1,714	774	2,488	534	244	778
4 percent assumption:						
A	1,532	552	2,084	478	173	651
B	784	288	1,072	245	91	336
C	1,112	708	1,820	345	223	568
Total	3,428	1,548	4,976	1,068	487	1,555

* Feed requirements were computed on the basis of:
Hogs, 1 kilo per day (average for all hogs).
Poultry, 50 grams per day (average for all poultry).

** Represents the daily required supply of feed when the feed mills operate on a 6-day week. In other words, the daily requirement for 7 days has been divided by 6.

RECOMMENDED FEED MILL SIZES

To provide guaranteed quality feeds, it is essential that the feed mills be equipped with laboratory equipment, employ appropriately skilled laboratory personnel, and make appropriate use of consulting nutritionists. Thus, a feed mill with a rated output capacity of much less than 500 bags per day would not likely be feasible. As a result, projections have been made for 3 feed mill sizes (based on rated capacities) of 500, 1,000 and 1,500 bags per day.

Using the 1 percent assumption (as to level of feeding mixed feed), a 500 bags-per-day mill, with some overtine operations, should be adequate for the group A provinces and a 500 bags-per-day mill should be adequate for the group C provinces. A high quality feed mill for the group B provinces would not likely be justified.

More realistically, using the 2 percent assumption regarding the feeding level, a 1,000 bags-per-day mill, with some overtime, should be adequate for area A; the same size of mill should be adequate for area C; and a 500 bags-per-day mill, with some overtime, should be adequate for area B.

On a longer-run basis, assuming a 4 percent level of feeding mixed feed, 1,500 bags-per-day mills, with overtime, should be adequate for areas A and C; a 1,000 bags-per-day mill, with some overtime, should be adequate for area B.

RECOMMENDED LOCATIONS

The recommended locations are as follows:

Provincial group A: Cagayan de Oro.

Provincial group B: Davao.

Provincial group C: General Santos.

FINANCIAL ANALYSIS

Basic Assumption and Facts

1. Rated plant capacities: 500, 1,000, and 1,500 bags per day.

2. Effective operating capacities at 90 percent: 450, 900 and 1,350 bags per day.

3. Personnel requirements:

Item	Rated capacity: bags per day		
	500	1,000	1,500
	Peso cost per month		
Manager	700	800	1,200
Plant superintendent	-	500	700
Salesman @ ₱300 each	600	1,200	1,800
Nutritionist (Consulting basis)	600	800	1,000
Laborers @ ₱8.00 per day	1,248	2,496	3,744
Helpers @ ₱6.00 per day	312	468	468
Chemist	400	500	600
Laboratory helper	240	260	280
Warehouseman	400	500	600
Clerk	240	250	260
Bookeeper/accountant	400	500	500
Total	5,140	8,274	11,152

4. Composition and cost of poultry laying mash (17% protein):

Ingredient	Weight (Kilos)	Cost* (Pesos)
Ground yellow corn	45.00	22.25
Fine rice bran	20.00	5.00
Soybean oil meal	12.00	10.80
Fish meal	6.50	8.45
Copra meal	6.00	2.16
Ipil-ipil leaf meal	3.00	0.60
Limestone	5.25	0.26
Phosphate, dicalcium	0.75	0.75
Salt	0.50	0.10
Vit.-min.-antibiotic mix	1.00	6.50
Total	100.00	56.87 (or ₱22.75/bag)

Based on reported prices in the Mindanao area, 1971.

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5. Composition and cost of hog growing ration (16% protein):

Ingredient	Weight (Kilos)	Cost* (Pesos)
Corn bran	80.00	28.00
Fish meal	5.00	6.50
Soybean oil meal	5.00	4.50
Copra meal	7.00	2.52
Bone meal	2.00	2.00
Salt	0.50	0.10
Vit.-min.-antibiotic mix	0.50	3.25
Total	100.00	46.87 (or 18.75/bag)

*Based on reported prices in the Mindanao area, 1971.

6. Monthly plant output (26 days per month at 90%):

Item	Rated capacity: bags/day		
	500	1,000	1,500
Bags of poultry feed	3,500	7,000	10,500
Bags of hog feed	8,200	16,400	24,600
Total	11,700	23,400	35,100

7. Detailed total cost per bag of poultry laying mash (17% protein):

Item	Bags per month		
	3,500	7,000	10,500
	Peso cost per bag		
Ingredients	22.75	22.75	22.75
Labor	0.44	0.35	0.32
Depreciation	0.29	0.21	0.17
General operating costs*	0.30	0.30	0.30
Bag	1.20	1.20	1.20
Interest	0.63	0.54	0.50
Total	25.61	25.35	25.24

*Includes supplies, fuel, power, repairs and maintenance, transportation, fees, licenses, etc.

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8. Detailed total cost per bag of hog growing mash (16% protein):

Item	Bags per month		
	8,200	16,400	24,600
	Peso cost per bag		
Ingredients	18.75	18.75	18.75
Labor	0.44	0.35	0.32
Depreciation	0.29	0.21	0.17
General operating costs*	0.30	0.30	0.30
Bag	1.20	1.20	1.20
Interest	0.63	0.54	0.50
Total	21.61	21.35	21.24

*Includes supplies, fuel, power, repairs and maintenance, transportation, fees, licenses, etc.

9. Assumed selling prices, ex-mill (or delivered within 50 km. radius) based on 1971 costs:

Poultry laying mash:	₱26.70.
Hog growing mash:	₱23.10.

10. Cost of feed, ex-mill, Mindanao area at the time of survey, June 1971:

Poultry laying mash	₱28.00 to ₱33.50 per bag.
Hog growing mash:	₱25.40 to ₱28.00 per bag.

Capital Requirements

The initial capital requirements, including a 4-month supply of corn and a 2-month supply of other raw materials and bags, for feed mills with rated capacities of 500, 1,000 and 1,500 bags per day total ₱736,000, ₱1,260,600, and ₱1,757,660, respectively. About 46 to 32 percent of the capital requirement is for the buildings and equipment and 54 to 68 percent is for the supply of raw materials (Table 5). A feed mill with these rated capacities should produce 11,700, 23,400 and 35,100 bags per month or 140,400, 280,800 and 421,200 bags per year, respectively, operating at an effective rate of 90 percent and without overtime operations.

TABLE 5. PROJECTED CAPITAL REQUIREMENTS FOR 3 SIZES OF FEED MILLS

Item	Rated capacity: bags per day		
	500	1,000	1,500
		Pesos	
A. Building and equipment:			
Feed plant & warehouse	100,000	130,000	150,000
Feed mixer	15,000	25,000	35,000
Hammermill	18,000	30,000	40,000
Platform scale	2,000	4,000	4,000
Automatic bag closer	4,000	8,000	8,000
Hand trucks	400	800	1,200
Delivery trucks	80,000	120,000	160,000
Corn drier	20,000	30,000	30,000
Corn silo	80,000	100,000	120,000
Sub-total	319,400	447,800	548,200
B. Laboratory equipment:			
Electric burner	15,000	15,000	15,000
Keldhal flasks			
Analytical balance			
Toledo laboratory balance			
Electric oven			
Moisture tester			
Set titrating equipment			
Sub-total	15,000	15,000	15,000
C. Office equipment:			
Typewriter	5,000	5,000	5,000
Calculator			
Office tables & chairs			
Sub-total	5,000	5,000	5,000
D. Inventory of materials*			
Corn @ ₱0.50/kilo	126,000	252,000	378,000
Rice bran @ ₱0.25/kilo	14,000	28,000	42,000
Soybean oil meal @ ₱0.90/kilo	71,700	143,300	215,000
Fish meal @ ₱1.30/kilo	69,800	139,500	209,300
Bone meal @ ₱1.00/kilo	13,000	26,000	39,000
Copra meal @ ₱0.36/kilo	22,000	44,000	65,880
Ipil-ipil leaf meal @ ₱0.20/ kilo	1,700	3,300	5,000
Limestone @ ₱0.05/kilo	700	1,400	2,200
Phosphate, dicalcium @ ₱1.00/ kilo	2,000	4,000	6,000
Salt @ ₱0.20/kilo	900	1,800	2,800
Vit.-min.-antibiotic mix @ ₱6.50/kilo	42,000	84,000	126,000
Bags @ ₱1.20 each	28,100	56,200	84,280
Laboratory & office supplies	4,700	9,300	14,000
Sub-total	396,600	792,800	1,189,460
Grand total	736,000	1,260,600	1,757,660

* 4-month supply of corn; 2 month supply of all other items.

Income of Feed Mills

The assumed selling prices of poultry and hog feed of ₱26.70 and ₱23.10/bag, respectively, are ₱1.30 and ₱2.30 lower per bag than the 1971 prices of feed in the Mindanao area.[5] Even so, the expected net income of the 3 sizes of feed mills was projected to be ₱191,000, ₱458,000 and ₱732,000 (before taxes). This equals a return to capital of about 38, 48, and 54 percent, respectively (Table 6). These income data represent the benefits of feed mills to the feed mill owners.

TABLE 6. PROJECTED INCOME STATEMENT FOR 3 SIZES OF FEED MILLS, 1973

Item	Rated capacity: bags/day		
	500*	1,000**	1,500***
		Thousand pesos	
Income:			
Sales of poultry feed	1,121	2,243	3,364
Sales of hog feed	2,273	4,546	6,819
Total income	3,394	6,789	10,183
Expenses:			
Feed ingredients	2,800	5,601	8,401
Salaries and wages	62	99	134
Bags	169	337	506
General operating costs	42	84	126
Interest	88	151	211
Depreciation	42	59	73
Total expenses	3,203	6,331	9,451
Net income	191	458	732
Percent return on investment	38	48	54

* For areas A and C with 1 percent assumption and area B with 2 percent assumption.

** For areas A and C with 2 percent assumption and area B with 4 percent assumption.

*** For areas A and C with 4 percent assumption.

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5. This pricing structure was used to stimulate the use of mixed hog feed. Currently, most of the feed shipped to Mindanao consists of poultry feed.

POTENTIAL NET SAVINGS TO PRODUCERS

Based on the potential feed requirements given in Table 4, the expected annual savings to livestock and poultry producers, using the conservative 1 percent assumption is ₱330,000 for the group A provinces and ₱273,000 for the group C provinces, or a total saving of ₱603,000 for both groups (Table 7). With the more realistic, short-run, 2 percent assumption, the savings total ₱663,000 for group A, ₱341,000 for group B, and ₱542,000 for group C, or a total saving of ₱1,546,000 for all groups. With the longer-run 4 percent assumption, the savings amount to ₱1,324,000 for group A, ₱682,000 for group B, and ₱1,084,000 for group C, or a total of ₱3,090,000 for all groups.

TABLE 7. POTENTIAL SAVINGS TO THE MINDANAO LIVESTOCK INDUSTRY, 1973

Assumption and provincial group	Rated mill capacity: bags per day	Hog feed	Poultry feed	Total
		Thousand pesos		
1 percent assumption:				
A	500	274	56	330
B	Feed mill not likely justified			
C	500	200	73	273
Total	-	474	129	603
2 percent assumption:				
A	1,000	550	113	663
B	500	281	60	341
C	1,000	398	144	542
Total	-	1,229	317	1,546
4 percent assumption:				
A	1,500	1,099	225	1,324
B	1,000	564	118	682
C	1,500	794	290	1,084
Total	-	2,457	633	3,090

These substantial savings to producers of hogs and poultry should greatly stimulate the use of mixed feed in the Mindanao area.

CONCLUSION

Based on this analysis, it appears that the location of feed mills in Mindanao and the operation of such mills to produce uniform, high-quality feed would:

1. Be profitable operations for the owners of the feed mills, and
2. Provide substantial savings through lower feed prices to producers.

The latter benefit, in turn, should stimulate the use of high-quality mixed feed to the benefit of:

1. The feed mill owner(s),
2. The livestock producers, and
3. The national effort to increase livestock production.

In addition, improved outlets for feed grains should be provided. This should benefit:

1. The producers of feed grains, and
2. The national feed-grain production program.